Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

HGM21-02 Room:301A Time:May 23 14:00-14:15

Quantitative determination of erosion rates in humid region using depth profiles of in situ-produced Be-10 and Al-26

NAKAMURA, Atsunori[1*], YOKOYAMA, Yusuke[1], MIYAIRI, Yosuke[1], SHIROYA, Kazuyo[2], Hiroyuki Matsuzaki[3], SUZUKI, Atsushi[2]

[1]Atmosphere and Ocean Research Institute, University of Tokyo, [2]National Institute of Advanced Industrial Science and Technology, [3]Department of Nuclear Engineering and Management, The University of Tokyo

Quantitative determination of erosion rates is important across a diverse range of disciplines in geology, geomorphology, and biogeochemistry (Granger and Riebe, 2007) . Yet rates of erosion have until recently been difficult to quantify over long timescale. Measurements of in-situ produced terrestrial cosmogenic nuclides (TCN) allow us to understand earth surface process quantitatively (Goss and Phillips, 2001). It has been successfully used to provide erosion rates of bedrock in arid regions where slow erosion process take place (e.g. Cockburn et al., 1999). On a global scale, environmental parameters such as mean annual precipitation have been used to explain erosion rate variability (Bierman and Cafee, 2002). However, the relationship between erosion rates and precipitation is still under debate due in part to scarcity of data from humid regions. In addition, erosion rates deduced from drainage basins, which is the only method to quantify erosion rates in humid regions, are strongly affected by basin slope (Riebe et al., 2000). Therefore, different approach to determine the erosion rates in humid regions is required to corroborate findings from arid regions. Here we present hilltop depth profiles of in situ-produced 10Be and 26Al from Japan. Due to such sampling location, the contribution of basin slope should be minimized, allowing a direct comparison to studies of bedrock erosion rates in arid regions. When applying TCN-based erosion rates in mid latitude humid regions, where granitic saprolite is distributed, density uncertainties play an important role in determining erosion rate. The aims of this study are (1) to develop a model for TCN depth profiles, based on actually measured density in granitic saprolite, and (2) to assess the correlation of erosion rates and precipitation. These data indicate a link between earth surface process and climatic condition.

Keywords: cosmogenic nuclides, erosion rate, climate